REPORT RESUMES

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FACTORS ASSOCIATED WITH A PROGRAM FOR ENCOURAGING SELF-INITIATED ACTIVITIES BY FIFTH AND SIXTH GRADE STUDENTS IN A SELECTED ELEMENTARY SCHOOL EMPHASIZING INDIVIDUALIZED INSTRUCTION.

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RECENT RESEARCH ON INDIVIDUALIZED INSTRUCTION AND ITS EFFECT ON SELF-INITIATED LEARNING BEHAVIOR SUGGESTS THAT A CLASSROOM ATMOSPHERE OF GUIDED SELF-DEVELOPMENT AND AN EDUCATIONAL SYSTEM ADAPTABLE TO INDIVIDUAL DIFFERENCES ARE MOST EFFECTIVE IN PROMOTING THE GROWTH OF THE PUPIL'S FULL TALENTS, CREATIVITY, AND INTEREST. THIS STUDY ATTEMPTED AN ANALYSIS OF THE RELATIONSHIP BETWEEN INDIVIDUALIZED INSTRUCTION AND SELF-INITIATION. DURING A 4-MONTH PERIOD, 28 FIFTH GRADE PUPILS AND 22 SIXTH GRADE PUPILS RECEIVED 3 EXPERIMENTAL TREATMENTS INTENDED TO ENCOURAGE SELF-INITIATED LEARNING BEHAVIOR. THESE INCLUDED (1) DEVELOPMENT OF A MATHEMATICS MATERIAL CENTER BY THE CHILDREN, (2) SELECTION OF OPTIONAL WORK IN MATHEMATICS, AND (3) REINFORCEMENT OF PUPILS BY THE TEACHER DURING MATHEMATICS CLASS. THE 3 TREATMENTS WERE INTRODUCED IN A STAGGERED ORDER, NOT ALL AT ONE TIME. STUDENTS WERE OBSERVED DURING MATHEMATICS, SCIENCE, AND SOCIAL STUDIES CLASSES BUT ONLY THE MATHEMATICS CLASS HAD AN INDIVIDUALIZED INSTRUCTION ORIENTATION. MEASURING INSTRUMENTS WERE DESIGNED TO QUANTIFY PUPIL BEHAVIOR. NINE HYPOTHESES WERE TESTED. FOUR WERE REJECTED, 5 WERE NOT. THE RESULTS INDICATED THAT MORE SELF-INITIATED BEHAVIOR WAS ENCOURAGED BY THE INDIVIDUALIZED MATHEMATICS CLASS THAN BY THE TEACHER-DOMINATED SCIENCE AND SOCIAL STUDIES CLASSES. THE GENERAL FINDING WAS THAT A HIGHLY-INDIVIDUALIZED CLASSROOM ENVIRONMENT ENCOURAGES SELF-INITIATED LEARNING BEHAVIOR. (WD)

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FOREWORD

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I. INTRODUCTION AND RELATED RESEARCH

A major challenge that has faced education is how to provide for the differences in pupil aptitude and interest within the framework of a school program necessarily geared to mass education. Many American schools have placed an emphasis upon making provisions for individual differences and developing programs of individualized instruction. Recently, interest in achieving this goal has increased. Factors, such as the development of the non-graded school, the various methods of implementing team teaching, the development of self-instructional devices, establishment of learning material centers, and various educational experiments, have intensified this effort. Advantages of individualized instruction, such as saving of student time, child-set learning rate, development of independent study habits, and self-direction, are worthwhile attributes.

A survey of the history of instruction indicates that formal learning began as an individual affair, that is pupils came to school to receive instruction individually from a teacher. Circumstances mandated education for a select few; therefore, smaller numbers of pupils attended school. Consequently, individualized instruction was the technique used to teach. As educational advantages were offered to a larger fraction of the population, individualized instruction diminished.

To achieve sophistication in individualization, development of a curriculum specifying behavioral objectives, the ability to diagnose student needs, and the capacity to prescribe the learning material is mandatory. This would seem to imply that a program for individualizing instruction necessarily requires the imposing of considerable structure upon the learning situation and on pupil activities. However, investigations of creativity indicate that self-initiation seems to be encouraged in situations that are not overly detailed in supervision and that do not rely on a prescribed curriculum. If this is so, and if self-initiation and self-directions are desirable outgrowths of instruction, can self-initiation be an essential element in an individualized program?

Research indicating great differences among individual pupils is reported by Berson,[1] Jones,[2] Webster and others,[3] and Goodlad and Anderson.[4] These researchers clearly state that just as pupils differ greatly in physical development, motor, intellectual, emotional, and social behavior they also display wide differences in aptitude and achievement. Fredrick Burk attempted to provide for these differences in aptitude and achievement by pioneering the development of material for individualized instruction. His efforts are reported by Washburne[5] and Billet.[6]

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[1] Minnie P. Berson, "Individual Differences Among Preschool Children: Four-Year Olds," Individualizing Instruction, Sixty-First Yearbook, NSSE, Chicago, Illinois, 1962, pp. 112-125.

[2] Harold E. Jones and Mary C. Jones, "Individual Differences in Early Adolescence," Individualizing Instruction, Sixty-First Yearbook, NSSE, Chicago, Illinois, 1962, pp. 126-144.

[3] Harold Webster, Martin Trow, and T. R. McConnell, "Individual Differences Among College Freshmen," Individualizing Instruction, Sixty-First Yearbook, NSSE, Chicago, Illinois, 1962, pp. 145-162.

[4] John I. Goodlad and Robert Anderson, The Nongraded Elementary School, Harcourt, Brace and World, New York, 1959, pp. 1-29.

[5] Charleton W. Washburne, "Burk's Individual System as Developed at Winnetka," Adapting the Schools to Individual Differences, Twenty-Fourth Yearbook, NSSE, Bloomington, Illinois, 1925, pp. 77-82.

[6] R. O. Billett, Provisions for Individual Differences: Marking and Promotion, U. S. Office of Education Bulletin No. 17, 1933, p. 422.

Systematic plans for providing instruction on an individual basis date back as far as 1888, with the work of Preston Search.[1] A historical overview of organizational plans since 1850 indicates that there has been considerable debate and little agreement on the best framework for teaching and learning. As Shane points out:

> Old ideas have continually reappeared on the educational scene, and a genuinely novel approach has occasionally made its appearance, but never has anything remotely resembling a consensus with respect to a best kind of classroom organization found universal acceptance.[2]

Further, Shane reviewed the history of organizational plans concerned with individual differences. He noted that:

> In general, during the past century, educators have endeavored: (a) to reduce individual differences found in the nongraded schools of the seventeenth and eighteenth centuries by introducing grade level, (b) to make the graded approach less arbitrary by permitting pupils to progress at different rates of speed on "multiple-tract" or individualized programs, (c) to organize students within a given grade level through ability grouping, and (d) to introduce ungraded grouping, especially during the early elementary years, as in Milwaukee during the early 1940's.[3]

Shane[4] also notes that the historically significant plans dealing with individual differences within the organization of the school have been related to grouping for instruction.

Evidence that individualization of school programs can save time, can reduce retardation of students, and can serve as a motivating factor is noted by several researchers. Henderson, Long, and Iler[1] concluded, "Paced instruction designed to insure success as a reward for individual effort is a prominent characteristic of most corrective programs." They further stated, "It is possible that a major effect of this technique is a gradual development of a new self-reliance, which releases the child from a dependence upon others and permits him to deal more effectively with the printed page." Mayer-Oakes[2] reported a gain of 25 per cent in proportion of students passing the state-wide examination after experience with the Dalton Plan. Peters'[3] findings, based on thirteen experiments, showed favorable results for individualizing instruction when comparing the contract plan and the recitation method.

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[1] Max G. Wingo, "Methods of Teaching," Encyclopedia of Educational Research, MacMillan Company, New York, 1960, p. 854.

[2] Harold G. Shane, "The School and Individual Differences," Individualizing Instruction, Sixty-First Yearbook, NSSE, Chicago, Illinois, 1962, p. 48.

[3] Ibid., p. 48.

[4] Harold G. Shane, "Grouping in the Elementary School," Phi Delta Kappan, April 1960, pp. 313-319.

Research efforts of Washburne and Marland,[4] Jones,[5] and Peters[6] indicate attempts to provide for individual differences. Jones[7] also points out that when provisions are made for some of the differences, classroom instruction can be made more effective.

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[1] Edmund H. Henderson, Barbara H. Long, and Robert C. Z. Iler, "Self-Social Constructs of Achieving and Nonachieving Reading," The Reading Teacher, Newark, Delaware, November 1965, p. 117.

[2] G. H. Mayer-Oakes, "The Dalton Plan in a Small High School," Education, 57, (September 1936-June 1937), pp. 244-248.

[3] C. C. Peters, "An Example of Replication of an Experiment for Reliability," Journal Educational Research, 32, (September 1938), pp. 3-9.

[4] Charleton Washburne and Sidney P. Marland, Winnetka: The History and Significance of an Educational Experiment, Prentice-Hall, Inc., 1963, p. 402.

[5] Daisey M. Jones, "An Experiment in Adaptation to Individual Differences," Journal of Educational Psychology, 39, 1948, pp. 257-272.

[6] Peters, op. cit., p. 38.

[7] Jones, op. cit., pp. 257-272.

Independent study is an outgrowth of attempts to individualize instruction. Marland[1] states, "Self-instruction, self-motivation, and independent inquiry are characteristics of education to be strongly enhanced by teachers and school organization." Baskin[2] reports that there is persuative evidence from experimentation indicating learning is more effective with the use of independent study programs. He further points out that students at various ability levels profit significantly from working on their own. Through individualized instruction, it appears one can expect student growth in self-analysis, self-correction, and self-direction. It further appears that student failure in self-development should create a challenge to teachers rather than an excuse to return to teacher domination and group regimentation.

Torrance[3] and earlier writers signify the importance of giving credit to students for self-initiated learning. Boraas[4] reviewed the difficulty of encouraging initiative and proposed two basic principles. Essentially, these principles are that initiative can be fostered by permitting pupils to think for themselves and to practice those forms of initiative that interest them. Taylor discusses the principles set forth by Boraas and states:

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[1] Sidney P. Marland, "Winnetka's Learning Laboratory," Educational Leadership, April 1963, p. 459.

[2] Samuel Baskin, "Quest for Quality: Some Models and Means," New Dimensions in Higher Education, U. S. Office of Education Bulletin No. 7, Washington, D. C., 1960.

[3] E. Paul Torrance, New Educational Ideas: Third Minnesota Conference on Gifted Children, Center for Continuation Study, University of Minnesota, 1961, pp. 51-66.

[4] R. O. Boraas, Teaching to Think, MacMillan Company, New York, 1922.

> Boraas in 1922 recognized that these were trite and commonplace principles. Nevertheless, it is probably fair to say that we do not yet know how to apply them and do not know what would happen if they were applied.[1]

"Excite and direct the self-activities of the learner and tell him nothing that he can learn for himself," is an old principle of learning, says Torrance.[2] Individualized instruction attempts to permit children every opportunity for self-direction that Boraas wrote about some forty years ago.

Torrance makes a strong plea for providing opportunities and giving credit for self-initiation. He states:

> The reason for evaluating and crediting self-initiated learning and thinking seems quite simple. Because grades are important to students, they tend to learn whatever is necessary to obtain desirable grades. If we base our evaluation on the memorization of details, students will memorize the texts and lectures. If we base grades on ability to integrate and apply principles, students will attempt to perform accordingly. If we give credit for the development of original ideas for self-initiated activities, achievement along this line will be forthcoming.[3]

Torrance also points out that,

> "Overly detailed supervision, too much reliance upon a prescribed curriculum, failure to appraise learning resulting from the child's own initiative, and attempts to cover too much material with no opportunity for reflection interfere seriously with such efforts."[4]

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[1] Calvin W. Taylor (ed.), Creativity: Progress and Potential, McGraw Hill Book Company, New York, 1964, p. 94.

[2] E. Paul Torrance, Education and the Creative Potential, The University of Minnesota Press, Minneapolis, 1963, p. 57.

[3] Torrance, op. cit., p. 57.

[4] E. Paul Torrance, "Conditions for Creative Learning," Childhood Education, Association for Childhood Education International, Washington, D. C., April 1963, p. 370.

Taylor believes that, "For the greatest pay-off, self-initiated learning must be supplemented by the development of skills in research, or how to learn."[1]

While experimenting with a method for developing creative thinking, Enoche[2] lists five principles that should be emphasized. His principles are: (1) treat pupil questions with respect, (2) treat unusual ideas with respect, (3) show pupils their ideas have value, (4) encourage self-initiated learnings, and (5) give opportunity for practice without immediate evaluation. His study demonstrates that creative thinking can be fostered by applying such principles. It seems clear that if self-initiation is to be encouraged, specific provisions must be made for this type of development. On the basis of research completed at the University of Minnesota, Torrance[3] suggests the following as promising approaches for adapting to individual differences in relation to creativity:

> 1. Provide for and give credit or recognition for self-initiated learning.
>
> 2. Create situations in which children have an opportunity to do things on their own and to learn on their own.
>
> 3. Provide a responsive environment which involves a sensitive and alert type of guidance, building an atmosphere of receptive listening, relieving feats, fending off disparagement and criticism; making sure that every sincere effort beings enough satisfaction to assure continued effort; keeping alive the zest for continued learning and thinking.

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[1] Taylor, op. cit., p. 94.

[2] Paul David Enoche, "An Experimental Study of a Method for Developing Creative Thinking in Fifth Grade Children," Doctoral Dissertation, University of Missouri, 1964.

[3] E. Paul Torrance, "Individual Difference in Relation to Creativity," Individualizing Instruction, Association for Childhood Education Intemnational, Washington, D. C., 1964, pp. 19-20.

4. Revise concepts of readiness in terms of what the child is able to learn and is motivated to learn.

5. Help the child in his search for himself and his uniqueness and in the discovery of his potentialities.

6. Respect varied talents, even varied ways of being creative.

7. Help the child recognize the value of his talents and of his ideas.

8. Help the child develop a creative acceptance of his limitations by emphasizing the use of his potentialities rather than the elimination of his limitations or liabilities.

9. Stop equating uniqueness of differentness with mental illness or delinquency.

10. Develop in the group a pride in the unique achievements of one another.

11. Help to reduce the isolation of the highly creative child.

12. Help find sponsors or patrons of the lonely, creative child.

13. Learn to exploit chance occurrences and unexpected incidents for great moments in learning and thinking.

14. Help highly creative children learn to cope with their anxieties and fears.

The importance of providing specific provisions to encourage self-initiation appears to be substantiated by the literature on creativity.

Though many techniques for systematic observation of classroom behavior have been developed over the past several decades, attention to self-initiation usually has not been included. Where initiation has been measured, it generally has been in relation to teacher behavior in classroom situations. Wrightstone[1] and Puckett[2] were early developers of systems measuring classroom behavior. Wrightstone[1] developed sets of categories for recording pupil responses in group situations. Initiative as investigated by Wrightstone, was a measure of prepared voluntary reports, extemporaneous contributions in suggesting means or solutions for problems.

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[1] J. W. Wrightstone, "Measuring Teacher Conduct of Class Discussion," Elementary School Journal, 34, (September 1933-June 1934), pp. 454-460.

[2] R. C. Puckett, "Making Supervision Objective," School Review, 34, (January-December, 1928), pp. 210-212.

Jersild and others[2] compared certain items of pupil behavior in activity and non-activity schools of New York City. Self-initiation was one aspect of the investigations. Attempts were made to measure children's voluntary contributions to school activities and suggestions from students for developing projects. In activity classes two to three times as much self-initiation was found as in the control classes.

Cornell, Lindvall and Saupe[3] define initiative in a study measuring differences in classrooms as "the extent to which pupils are permitted to control the learning situation." A later attempt to identify such behavior was made by Muriel Wright and Virginia Proctor.[4] They developed an Index of Initiative based on a weighted composite of curiosity, independence, receptivity, and neutral behavior.

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[1] J. W. Wrightstone, Appraisal of Newer Practices in Selected Public Schools, New York: Bureau of Publications, Teachers College, Columbia University, 1935.

[2] A. T. Jersild, R. L. Thorndike, B. Goldman, and J. J. Laftees, "An Evaluation of Aspects of the Activity Program in the New York City Public Elementary Schools," Journal Experimental Education, 1939, 8, pp. 166-207.

[3] F. G. Cornell, C. M. Lindvall, and J. L. Saupe, "An Exploratory Measurement of Individualities of Schools and Classrooms," Urbana: Bureau of Educational Research, University of Illinois, 1952, pp. 53-54.

[4] E. Muriel Wright and Virginia H. Proctor, Systematic Observation of Verbal Interaction as a Method of Comparing Mathematics Lessons, U. S. Office of Education, Cooperative Research Project No. 816, 1961.

Self-initiation as a dimension of individualization and independent study has rarely been measured. Cogan[1] concluded, when investigating theory and design of teacher-pupil interaction that, "the self-initiation work score especially offers exciting new possibilities since it seems to represent a major but rarely measured objective of much modern instructional theory and practice." When focusing on the relationship between observable behavior of teachers and the required and self-initiated work of pupils, Cogan[2] found a strong relationship between the behavior of teachers and the self-initiated work of their pupils. Reed[3] notes that pupils report themselves as being more self-initiated when they perceive the teacher as deliberately encouraging such activities.

It appears that the identifying and measuring of self-initiation in the classroom requires the identification and assessment of many relatively minor manifestations. Several researchers, when developing instruments to measure student behaviors, have made this fact clear. Lindvall[4] specifies such items as pupils work problems at their seats, pupils draw or paint, pupils give talks or reports, pupils work on experiments, and pupils write tests as examples of measurable behavior. Roswell C. Puckett[1] lists such items as pupil raised hand and was called on by teacher and pupil asked questions. Wrightstone[2] listed on his instrument to measure classroom behavior that pupils prepare a question or thesis, and pupils suggest means, method, activity, or solutions. Therefore, in developing instruments to measure self-initiation, many of the specific pupil behaviors used by previous researchers are included.

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[1] M. L. Cogan, "Theory and Design of a Study of Teacher-Pupil Interaction," Harvard Education Review, 24, (Fall 1956), pp. 315-343.

[2] M. L. Cogan, "The Behavior of Teachers and the Productive Behavior of their Pupils: Perception Analysis," Journal of Experimental Education, December 1958, pp. 89-105.

[3] H. B. Reed, Jr., "Teacher Variables of Warmth, Demand, and Utilization of Intrinsic Motivation Related to Pupils' Science Interest: A Study Illustrating Several Potentials of Variance-Covariance," Journal Experimental Psychology, 1961, pp. 205-229.

[4] Carl Mauritz Lindvall, "Observable Differences in Classroom Practices," Doctoral Dissertation, University of Illinois, 1953, Appendix B, p. 123.

The Learning Research and Development Center at the University of Pittsburgh is making a concentrated study of the problems involved in developing techniques to provide for individual differences. This project, known as Individually Prescribed Instruction, has as one of its major goals. . . "the study of the feasibility of procedures for producing an educational environment which is highly responsive to differences among children."[3] While the goals of individualized instruction have been enumerated quite often in recent years, what behavioral outcomes might be expected to be found in conjunction with such a program of instruction? When exploring this question, Glaser writes:

> First, a system of individualized instruction nurtures independent learning and, as a result, has the potential for producing individuals who are self-resourceful and self-appraising learners. Such individuals realize that education occurs as a result of their own initiative. This realization produces an adult who is equipped to constantly reexamine and reshape himself through learning. Resourceful individuals of this kind cannot be produced in any significant numbers by our traditional educational environment in

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[1] Roswell C. Puckett, "Making Supervision Objective," School Review, 36, (January-December 1928), p. 210.

[2] J. Wayne Wrightstone, "Measuring Teacher Conduct of Class Discussion," Elementary School Journal, 34, (September 1933-January 1934), p. 456.

[3] Robert Glaser, "Individualized Instruction: Notes on a Rationale of a System of Individually Prescribed Instruction," A Manual for the IPI Institute, Learning Research and Development Center, University of Pittsburgh, 1966, p. 8.

> which the primary burden of initiating and maintaining learning is the job of the teacher rather than the job of the learner. At the very least, this should be a shared endeavor.
>
> Second, instruction which adapts to individual requirements seems impossible to envision without inclusion of the notions of competence, mastery, and the attainment of standards. Unfettered by the practical necessity for group pacing and for adjustments to a teaching strategy adapted to the group average, it appears necessary for each individual to work to attain a standard of performance which permits him to move on in competence and knowledge. The possibilities of any one individual attaining competence is enhanced since the environment in which he can progress is adapted to his requirements and purposes undiluted by the frustrations of moving ahead with the bright students. In this way a realistic sense of achievement is developed which encourages the use of one's abilities. The admission to be made is that more than lip service must be paid to the undeniable fact that individuals do differ extensively in their abilities, and our educational system is under obligation to develop an operational capability in line with the facts of human behavior.[1]

If, as Glaser indicates, individualized instruction will produce a more "self-resourceful" and "self-appraising learner," a school emphasizing such instruction should reveal this type of behavior.

The Oakleaf Elementary School in the Baldwin-Whitehall School District as the demonstration center for the Individually Prescribed Instruction project provides a setting for an attempt to analyze the relationship between self-initiation and individualized instruction. A basic question of concern to this study includes the measuring of self-initiation in individualized and non-individualized classes. Does self-initiation correlate with I.Q., sex of students, and school achievement? Can individualized classes be "treated" to encourage self-initiation and what effects can be noted in non-individualized classes? This investigation, then, is concerned with factors associated with a program for encouraging self-initiation in a highly individualized environment.

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[1] Robert Glaser, "The Education of the Individual," Learning Research and Development Center, University of Pittsburgh, February 1966, pp. 2-3.

II. THE PROBLEM

A. Statement of the Problem

Will self-initiation increase when certain factors are introduced into the learning environment of fifth and sixth grade students in a selected elementary school emphasizing individualized instruction?

B. Hypotheses

The information obtained from observations before and after each treatment and from the questionnaires was analyzed to test the following hypotheses:

1. There will be a noticeable increase in self-initiated activities in the individualized mathematics classes after the treatments.

2. There will be no noticeable increase in self-initiation in the untreated subject of social studies.

3. There will be no noticeable increase in self-initiation in the untreated subject of science.

4. There is a significant relationship between I.Q. score and self-initiation.

5. There is a significant relationship between scores on standardized achievement tests in mathematics and self-initiation.

6. There is no significant relationship between sex of students and self-initiation.

7. There will be a significant increase in student interest in mathematics after self-initiation treatments.

8. There will be no significant change in the peer-evaluation of self-initiation.

9. There is a significant relationship between teacher rating and peer-evaluation of self-initiation.

C. Definition of Terms Used in the Problem

Certain terms used in this study are defined below.

Self-initiation. The behavior or activities as defined by Instrument One children exhibit within the classroom that relate to the subject being taught that cannot be clearly attributed to causes or stimuli outside the learner.

Teacher-initiation. The behavior or activities as defined by Instrument One children exhibit within the classroom that relate to the subject being taught that may be attributed to the teacher.

Peer-initiation. The behavior or activities as defined by Instrument One children exhibit within the classroom that relate to the school subject being taught that may be attributed to peers.

Individualized Mathematics. The individually prescribed mathematics curriculum used at the Oakleaf Elementary School in the Baldwin-Whitehall School District.

Individually Prescribed Instruction. The technique used to teach the individualized mathematics program of the Oakleaf Elementary School in the Baldwin-Whitehall School District.

I.Q. Index obtained from the California Short-Form Test of Mental Maturity.

Mathematic Achievement. The score obtained for arithmetic computation and arithmetic problem solving from the Metropolitan Achievement Test.

Treatment. A procedure introduced into the design of the study for the purpose of measuring its effect on self-initiation.

Pupil Interest. The aspects of the individualized mathematics curriculum that students choose to explore.

Basic Aims of the Program for Individually Prescribed Instruction.

(1) To obtain mastery of subject matter.

(2) To develop self-directed learners.

(3) To develop problem-solving thinking.

(4) To develop self-Initiation.

(5) To develop self-evaluation.[1]

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[1] John O. Bolvin, "The Child Versus the Curriculum," Learning Research and Development Center, University of Pittsburgh (Mimeographed), 1965, p. 4.

III. DESCRIPTION OF THE SCHOOL DISTRICT AND STUDENTS

A. The School District

The Baldwin-Whitehall School District is a second-class Pennsylvania school district, suburban residential in nature. It is located approximately ten miles south of the Golden Triangle in Pittsburgh, Pennsylvania. The assessed valuation of the school district is over 100 million dollars. Approximately 53,000 people live in the district.

Eleven elementary buildings, two junior high schools and one senior high school house approximately 8,500 pupils. Over 400 professional employees serve the students.

The socio-economic make-up of the school district tends to be upper-middle class.

B. Oakleaf School

The Oakleaf Elementary School is one of eleven elementary schools in the Baldwin-Whitehall School District. The school was opened February 14, 1964, housing one section of each grade from kindergarten through grade six. The present enrollment of Oakleaf School is 240. There are seven homeroom teachers, a science-math specialist, and a reading-librarian teacher. Oakleaf students have available the service of specialists in vocal and instrumental music, art, physical education, and speech correction. Also, the services of a nurse, dental hygienist, social worker, school psychologist, and psychiatrist are available.

The school day is from 9:10 to 4:00 for all children, with lunch from 12:10 to 1:00 for intermediate children, and 12:00 to 1:15 for primary children. The teacher's day begins at 8:20 and ends at 4:05.

All of the children at the Oakleaf School walk to school. The vast majority of students walk home for their lunch; however, a few children have to stay for lunch and the teachers take turns at lunchroom and playground duty.

This is the second year that the Oakleaf School has served as a pilot school in a study being conducted by the Learning Research and Development Center of the University of Pittsburgh in individualized instruction.

The socio-economic make-up of the Oakleaf School is lower than the total school district, tending to be lower-middle class.

C. The Population

Two classrooms containing 28 fifth grade students and 22 sixth grade students were involved in this study. The fifth grade is comprised of 12 girls and 16 boys, while the sixth grade has 11 girls and 11 boys. There are no students repeating either grade.

Table 1 presents intelligence data for the two classes, based on the California Short-Form Test of Mental Maturity given during the 1964-65 school year for the sixth grade and the 1965-66 school year for the fifth grade.

TABLE 1

I.Q. DATA FOR THE FIFTH AND SIXTH GRADES

GRADE	MEAN	MEDIAN	RANGE	STANDARD DEVIATION
Fifth Grade	115.04	113	100-132	8.1
Sixth Grade	116.04	120	84-132	12.1

Analysis of the parental background of both classes indicates that there are six fathers who have earned college degrees. The vast majority of mothers of the students are housewives, only three mothers being employed--two as secretaries, one as a nurse. Table 2 gives the mean education age of mothers and fathers of the students studied. It can be seen that the parents of the fifth grade class have obtained a higher educational level than those of the sixth grade.

TABLE 2

LEVEL OF EDUCATION, BY GRADES, OF PARENTS
OF THE FIFTH AND SIXTH GRADE CLASS

CLASS	GRADE LEVEL OF EDUCATION OF MOTHERS	GRADE LEVEL OF EDUCATION OF FATHERS	GRADE LEVELS REACHED BY FATHER & MOTHER
Fifth Grade	11.8	13.3	8-16
Sixth Grade	11.5	11.5	8-16

The fathers of the students studied are employed generally in blue collar and service occupations. Carpenters, plumbers, painters, clerks, policemen, truck drivers, mechanics, milkmen, and laborers are typical of the kind of jobs held by the fathers.

IV. PROCEDURE

A. General Method

Two classes of elementary school children were carefully studied over a four-month period from January to April, 1966. The study included the use of three instruments to measure (1) self-initiated behavior, (2) student interest, and (3) peer-group evaluation of initiation.

Three treatments to encourage self-initiation were introduced during the study. Student behavior was observed by the writer during mathematics, science, and social studies classes. Attempts were made to categorize the source of initiated behavior whether from the teacher, another pupil, or from the student himself. Only the mathematics classes received treatments during the study with the purpose of increasing self-initiation. Student interviews were conducted by the writer at the conclusion of the study to provide insight into student reaction. The time schedule of observations and treatments appears on page 23.

B. Instruments

Three instruments were developed for the study. Instrument One was used by the writer for categorizing the source of initiation for 16 items. Instrument Two was designed to measure student interest in the three school subjects of mathematics, science, and social studies. Instrument Three was used to measure peer ratings of the extra work each student contributed to his class. A detailed description of each instrument follows.

1. Instrument One was used by the writer during the classes of mathematics, science, and social studies before and after each treatment.

The instrument permitted the observed behavior to be categorized as to source of initiation, whether from teacher, peer, or self. The sixteen specific items, included in the instrument, are as follows:

a. Pupil displays materials brought into classroom

b. Pupil makes an oral report

c. Pupil presents a written report

d. Pupil volunteers to answer questions

e. Pupil suggests method or solution to problem

f. Pupil asks a question

g. Pupil volunteers to work on a committee

h. Pupil volunteers to do homework or research assignments

i. Pupil tells about a discussion with parents, friends, or classmates

j. Pupil tells about a trip or visit

k. Pupil tells about a T. V. program or movie

l. Pupil reads book in class

m. Pupil works with supplemental materials

n. Pupil requests study in special area

o. Pupil presents his material to another class

p. Pupil goes to library, book shelves, etc.

Eight observations by the writer, using Instrument One, wer completed for the three school subjects of mathematics, science, and socil studies for each class involved in the study.

2. Instrument Two was completed by each student at the inception and conclusion of the study, each rating his own degree of interest in the three school subjects. This instrument was divided into tw parts, administered in two sessions. Information was obtained from each studen concerning the following areas:

a. Reading for pleasure
b. Volunteering to answer questions
c. Collecting things
d. Doing extra work for class
e. Talking to parents
f. Talking to school friends
g. Playing school
h. Joining a club
i. Subject preference of mathematics, science, and social studies
j. Spending money for school items
k. Watching T. V. programs
l. Doing homework
m. Teaching a particular school subject
n. Writing stories

3. Instrument Three was completed by all students at the inception and conclusion of the study, each student evaluating how often his classmates did extra work for the class. A five-point rating scale ranging from "Never" to "Very Often" was used in Instrument Three. The classroom teachers also completed Instrument Three to determine the agreement between teacher rating and peer rating of the members of the two classes.

C. Treatments

The mathematics classes received three general treatments during the study. Each treatment was used for the purpose of encouraging self-initiation.

1. Treatment One included the selection of student volunteers from the two classes to help organize a mathematics materials center. The activity

of developing and organizing the mathematics materials center took place outside the regular school day. Materials gathered and housed in the center were drawn from those available in school and from student contributions. Student volunteers explained to their classmates what materials were available. Treatment One was designed to create an awareness of the wide range of supplementary materials available in mathematics and to encourage the use of such materials.

2. Treatment Two was designed to permit students to explore areas of mathematics that interest them. Half of the class time scheduled for mathematics was set aside for students to study an area of work other than that assigned by the teacher. The optional area of mathematics was selected by the students from one of the twelve units of the mathematics continuum in use by the school. Students were permitted to change their optional areas after the completion of a unit of work. During Treatment Two an attempt was made to provide opportunity to explore special interest areas in mathematics.

3. The purpose of Treatment Three was to provide special reinforcement or rewards for the students during the mathematics classes. Each teacher made a concentrated effort to praise exceptional work and display student materials. Seminar classes provided an opportunity for students to review their mathematical interests with other class members. Students used this opportunity to explain their special interest areas, display their work, and review findings. Treatment Three was designed to capitalize on special interests and to structure opportunities for teachers and students to praise exceptional work.

Treatment One was introduced during the first month of the study and was in effect during the entire study. Treatment Two was introduced during the second month of the study and again was in effect during the remaining portion of the study. Treatment Three was introduced during the third month of the study. It can be noted that all treatments, once begun, continued throughout the research.

D. Time Schedule

The study was conducted over a four-month period, January to April, during the school year 1965-66. Each of the two classes in mathematics, science, and social studies were observed eight times during this period when Instrument One was used. The time between the series of observations was devoted to the application of the three treatments. Sixteen weeks of observations and treatments were scheduled as follows:

TABLE 3

TIME SCHEDULE OF OBSERVATIONS AND TREATMENTS

WEEK	OBSERVATIONS	TREATMENT
1	1&2	
2	---	1
3	---	1
4	---	1
5	---	1
6	3&4	1
7	---	1&2
8	---	1&2
9	---	1&2
10	---	1&2
11	5&6	1&2
12	---	1&2&3
13	---	1&2&3
14	---	1&2&3
15	---	1&2&3
16	7&8	1&2&3

The pupils were observed during work on the school subjects of mathematics, science, and social studies twice during weeks 1, 6, 11, and

16 of the study. Thus, a total of eight observations for each of the three subjects for each of the two classes was made during the course of the study.

E. Setting

The Oakleaf Elementary School of Baldwin-Whitehall serves as a laboratory school for the development and trial of a program for Individually Prescribed Instruction, conducted by the Learning Research and Development Center at the University of Pittsburgh. As presently operated in the Oakleaf School, the individualized program involves students for less than one-half of each school day. Attention was being focused in three basic content areas: (1) Reading--kindergarten through sixth grade, (2) Mathematics--kindergarten through sixth grade, and (3) Science--kindergarten through third grade. During the rest of the school day students are engaged in study under procedures used in a conventional elementary school. Due to the individualization of the several programs of Oakleaf School, careful analysis of the fifth and sixth grade students functioning in a highly individualized mathematics program and the non-individualized programs of science and social studies was possible. Emphasis during the study was placed on the use of certain procedures in the mathematics classes to encourage self-initiation and noting the effects as compared with those in the science and social studies classes where this variable did not operate.

The individualized mathematics program was developed to better effect computational skills and the use of basic laws of mathematics by the pupils in developing the operations with numbers and in studying the properties of the number system. With leadership being provided by the Learning Research and Development Center of the University of Pittsburgh, the mathematics curriculum was developed and refined over a one-and-a-half year period prior to the study. At the time of the study the mathematics curriculum was divided into 13 units of work. The units were further divided into levels, and the levels consisted of behavioral objectives for each unit. A total of 365 objectives comprised the mathematics curriculum. Materials were either purchased or written to teach the objectives of the mathematics curriculum. Diagnostic instruments, written to measure the objectives, were used to aid in the placement of students in specific units and levels. Strategies were developed to permit the teacher to write a prescription, based on diagnostic techniques, for each student. Thus, individually prescribed instruction was used only in the teaching of mathematics in the present study.

The social studies program was based on the course of study provided by the Baldwin-Whitehall School District. The fifth grade students were involved in the study of the histroy and geography of the United States. A review of American life from the early explorers, colonization, independence, development to statehood for Alaska and Hawaii were the major units of the social studies program for fifth graders. The social studies program for sixth grade students was an historical review and a geographical analysis of Latin and South America. Topics such as The Life of Simon Bolivar, Countries South of the Tropics, and The All-American Team were typical.

The science program for fifth and sixth graders was organized in broad categories. All materials needed to teach each unit were packaged and routed to the elementary classes on a monthly basis.

At the time of this study, the fifth grade students investigated the areas of Machines, Sound, The Earth, and Animals of Yesterday. The sixth grade students investigated the areas of Rockets and Missiles, Satellites and Space Travel, Scientists and Their Tools, and Ways of the Weather.

Careful analysis of the fifty students in the two grades, their observed behavior in the individualized mathematics program, and the non-individualized programs of science and social studies, was one aspect of the present research. Investigation of student interest in the three subjects of Mathematics, Social Studies, and Science constituted another aspect of the study. Peer group and teacher ratings of the extent of the extra work each student contributed to his class was a third aspect of the study. Attempts were made to increase self-initiation in the mathematics classes and to note the effect of this on pupil behavior during the science and social studies classes in which no such attempts were made. Factors associated with the encouragement of self-initiation constituted the chief problem of the study.

V. PRESENTATION OF DATA

A. Classroom Observation

The fifth and sixth grade classes of mathematics, science, and social studies were observed eight times during the study using Instrument One. Two observations were conducted for each class during the first, sixth, eleventh, and sixteenth weeks of the study. The student population of the fifth grade class was 27, the sixth grade 22, thus making a total of 49 students observed.

The purpose of the classroom observations was to credit each student for behavior exhibited as defined by Instrument One. (See Appendix A.) Furthermore, the source of stimulation for the exhibited behavior was categorized. Each time a student exhibited any of the behaviors or activities listed in Instrument One, one point was credited to that student. If, for example, Student A was observed volunteering to do a homework or a research assignment, he was given one credit for that behavior. Furthermore, if the stimulation for doing homework appeared to be related to the teachers, it was categorized in the teacher-initiated column. If the student volunteered to do a homework or research assignment because another pupil suggested that this information was necessary, the behavior was categorized as peer-initiated. If, however, the student volunteered to do homework or a research assignment without teacher or peer stimulation, it was categorized as self-initiated. When the teacher assigned work to the whole class, each member was credited for this activity under the proper category. Therefore, the numbers that appear in the tables that follow represent the count taken for each item appearing in Instrument One, and are categorized in the proper column of teacher-initiated, peer-initiated, or self-initiated.

The first item listed in Instrument One was pupils display materials, such as newspapers, clippings, games, books, or collections brought into the classroom. This behavior was observed to take place sixteen times--eight incidents in each of the social studies and science classes. Pupils display of materials did not occur at all during the mathematics classes. Three of the sixteen recorded observations referred to above were directly related to teacher-initiation, while thirteen of the behaviors were credited as self-initiated. The data for this first item appears in Table 4.

TABLE 4

DATA OBTAINED FROM INSTRUMENT ONE: ITEM ONE--PUPILS DISPLAY MATERIALS

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	0	0	8	8
Science	3	0	5	8
Mathematics	0	0	0	0
TOTAL	3	0	13	16

Item two listed in Instrument One referred to oral reports by pupils. This behavior was observed to take place fifty-five times during the study--forty-nine incidents that were categorized as self-initiated and six as teacher-initiated. Thirty-eight incidents occurred in the social studies classes and seventeen in the science classes. No incidents of pupils making oral reports were observed in the mathematics classes. The data presented in Table 5 are for the second item in Instrument One.

TABLE 5

DATA OBTAINED FROM INSTRUMENT ONE: ITEM TWO--PUPILS MAKE AN ORAL REPORT

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	0	0	38	38
Science	6	0	11	17
Mathematics	0	0	0	0
TOTAL	6	0	49	55

Item three in Instrument One was pupils present a written report. This behavior was observed nineteen times during the study--ten in the social studies classes, and nine in the science classes. No incidents of pupils presenting written reports were observed in the mathematics classes. Eleven behaviors were credited as teacher-initiated, two as peer-initiated, and six as self-initiated. The data presented in Table 6 are a summary of the observed behavior.

Item four in Instrument One was pupils answer questions. This behavior was observed 2,052 times during the study. Sixty-one incidents of the observed behavior were categorized as self-initiated, and 126 peer-initiated. Pupils answering questions tended to be teacher-initiated with 1,865 recorded incidents in this category. As indicated in Table 7, 813 incidents were recorded for social studies, 793 in the science classes, and 446 in the mathematics classes.

TABLE 6

DATA OBTAINED FROM INSTRUMENT ONE: ITEM THREE--PUPILS PRESENT A WRITTEN REPORT

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	7	1	2	10
Science	4	1	4	9
Mathematics	0	0	0	0
TOTAL	11	2	6	19

TABLE 7

DATA OBTAINED FROM INSTRUMENT ONE: ITEM FOUR--PUPILS ANSWER QUESTIONS

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	713	66	34	813
Science	709	58	26	793
Mathematics	443	2	1	446
TOTAL	1,865	126	61	2,052

Item five in Instrument One was pupils volunteer to work on a committee. This behavior was observed sixty-four times during the study, occurring twenty-one times in the science classes and forty-three times in the social studies classes. Teacher-initiation was credited with forty-two incidents and self-initiation 20. This behavior was observed forty-three times in the social studies classes and twenty-one in the science classes. Pupils volunteering to work on a committee were not observed during visits to the mathematics classes. Appearing in Table 8 are the data for item five.

TABLE 8

DATA OBTAINED FROM INSTRUMENT ONE: ITEM FIVE--PUPILS WORK ON A COMMITTEE

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	21	2	20	43
Science	21	0	0	21
Mathematics	0	0	0	0
TOTAL	42	2	20	64

Item six in Instrument One was pupils volunteer to do homework or research assignments. This behavior was observed 540 times during the study. Forty-one incidents were categorized as self-initiated, while 497 as teacher-initiated. No incidents of this behavior were credited to mathematics. Two-hundred and forty-eight incidents were credited to the social studies classes, 292 to the science classes. The date obtained for item six are listed in Table 9.

Item seven in Instrument One was pupils suggest methods or solutions to problems. This behavior was observed thirty-four times during the study, occurring nineteen times in social studies and fourteen in the science classes. This behavior was only observed once in mathematics.

TABLE 9

DATA OBTAINED FROM INSTRUMENT ONE: ITEM SIX--PUPILS VOLUNTEER TO DO HOMEWORK OR RESEARCH ASSIGNMENTS

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIAT	TOTAL
Social Studies	207	2	39	248
Science	290	0	2	292
Mathematics	0	0	0	0
TOTAL	497	2	41	540

During the individualized mathematics classes, it was almo impossible to know when one student, talking privately with the teach, was suggesting methods or solutions to problems. Generally solutions sugsted by the students in the science and social studies classes were, " can find the answers in the encyclopedia." Thirty-Two of the observed [illegible] credited as self-initiated, and two were credited as teacher-initiated. The data obtained for item seven are listed in Table 10.

TABLE 10

DATA OBTAINED FROM INSTRUMENT ONE: ITEM SEVEN--PUPILS SUGGEST METHODS OR SOLUTIONS TO PROBLEMS

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	2	0	17	19
Science	0	0	14	14
Mathematics	0	0	1	1
TOTAL	2	0	32	34

Item eight in Instrument One was pupils tell about a discussion with parents, friends, or classmates. This behavior was observed fourteen times during the study with eleven of the observations taking place in the social studies classes and three in science. Teacher-initiated was credited with one, self-initiated twelve, and peer-initiated one. The date obtained for item eight appears in Table 11.

TABLE 11

DATA OBTAINED FROM INSTRUMENT ONE: ITEM EIGHT--PUPILS TELL ABOUT A DISCUSSION WITH PARENTS, FRIENDS

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	0	1	10	11
Science	1	0	2	3
Mathematics	0	0	0	0
TOTAL	1	1	12	14

Item nine in Instrument One was pupils tell about a trip or visit. Students exhibited this behavior thirty-three times during the study, occurring twenty-two times in the social studies classes and eleven in the science classes. Pupils telling about a trip or visit was not observed in the mathematics classes. This behavior was credited as self-initiated twenty-nine times. Table 12, and the date there presented are the summary of item nine.

Item ten in Instrument One was pupils tell about a TV program or movie. Students exhibited this behavior eleven times during the observations, occurring ten times during the science classes and once in the social studies classes. Nine behaviors were categorized as self-initiated, one as teacher-initiated, and one as peer-initiated. Pupils telling about a TV program or movie were not observed in the mathematics classes. Appearing in Table 13 are the data collected for item ten.

TABLE 12

DATA OBTAINED FROM INSTRUMENT ONE: ITEM NINE--PUPILS TELL ABOUT A TRIP OR VISIT

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	3	0	19	22
Science	1	0	10	11
Mathematics	0	0	0	0
TOTAL	4	0	29	33

TABLE 13

DATA OBTAINED FROM INSTRUMENT ONE: ITEM TEN--PUPILS TELL ABOUT A TV PROGRAM OR MOVIE

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	0	0	1	1
Science	1	1	8	10
Mathematics	0	0	0	0
TOTAL	1	1	9	11

Item eleven in Instrument One was pupils read a book in class. This behavior was observed 344 times during the study, 167 incidents credited to social studies, 153 to science, and 24 to mathematics. When the teacher directed the class to open their books to a certain section, each student was credited for this behavior and it was categorized as teacher-initiated. As one would suspect, this activity occurred most often as teacher-initiated. The mathematics and science classes produced the highest incidents of self-initiation for item eleven. Appearing in Table 14 is a summary of the data collected concerning pupils reading a book in class.

TABLE 14

DATA OBTAINED FROM INSTRUMENT ONE: ITEM ELEVEN--PUPILS READ A BOOK IN CLASS

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	162	0	5	167
Science	126	0	27	153
Mathematics	1	0	23	24
TOTAL	289	0	55	344

Item twelve in Instrument One was pupils work with suplemental materials. Supplemental materials were those learning tools ued by the students that are not usually part of the lesson materials. For example, maps, globes, film strips and counting frames were considered as supplemental materials. However, the regular textbooks and work pags were not considered supplemental. This behavior was observed 303 timesduring the study. The social studies classes produced a total of 199 incidents of this behavior, of these 183 were teacher-initiated. The mathematics classes produced 88 incidents of this behavior, all being self-initiated. As indicated in Table 15, the science classes produced the fewest number of incidents of pupils working with concrete materials

TABLE 15

DATA OBTAINED FROM INSTRUMENT ONE: ITEM TWELVE--PUPILS WORK WITH SUPPLEMENTAL MATERIALS

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	183	0	16	199
Science	4	0	12	16
Mathematics	0	0	88	88
TOTAL	187	0	116	303

Item thirteen in Instrument One was pupils request study in a special area. This behavior was observed six times during the study, occurring four times in the mathematics classes and twice in social studies. As might be expected, all of the observed behavior for this item was categorized as self-initiated. Appearing in Table 16 is a summary of the data collected for item thirteen.

Item fourteen in Instrument One was pupils present their materials to another class. This behavior never occurred during the observation.

TABLE 16

DATA OBTAINED FROM INSTRUMENT ONE: ITEM THIRTEEN--PUPILS REQUEST STUDY IN A SPECIAL AREA

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	0	0	2	2
Science	0	0	0	0
Mathematics	0	0	4	4
TOTAL	0	0	6	6

Item fifteen in Instrument One was pupils go to the library, clerks, or scoring keys. This behavior was observed 1,465 times during the observations. During the mathematics classes 1,410 incidents of students going to the clerks with materials to be corrected or obtaining self-scoring materials was categorized. Although this behavior might be considered part of the procedure of the individualized mathematics program, students did initiate such behavior without teacher direction. Therefore, 1,406 times when this behavior occurred during the mathematics classes, without specific teacher direction, it was credited as self-initiated. This accounts for the larger self-initiation in mathematics when compared with the science and social studies classes. Appearing in Table 17 are the data obtained from item fifteen.

Item sixteen in Instrument One was pupils ask questions. This item was not included as part of Instrument One during the first week of observations. Therefore, the results are based on three weeks of observations or a total of six class visits per subject. The behavior was observed 977 times, 928 incidents being credited as self-initiated. Students exhibited seven times as many incidents of asking questions in mathematics than they did in the science or social studies classes. As indicated in Table 18, this behavior was observed 118 times in the social studies classes, 137 in science, and 722 in mathematics. Questions asked by students that were in direct response to the teacher saying, "Are there any questions?" were categorized as teacher-initiated. Based on the six observations per subject and the 49 students observed, the average number of questions observed being asked was 19.6 in social studies, 22.8 in science, and 120.3 in mathematics.

TABLE 17

DATA OBTAINED FROM INSTRUMENT ONE: ITEM FIFTEEN--PUPILS GO TO LIBRARY, CLERKS, SCORING KEYS

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	22	3	25	50
Science	2	0	3	5
Mathematics	4	0	1,406	1,410
TOTAL	28	3	1,434	1,465

TABLE 18

DATA OBTAINED FROM INSTRUMENT ONE: ITEM SIXTEEN--PUPILS ASK QUESTIONS

CLASS	TEACHER-INITIATED	PEER-INITIATED	SELF-INITIATED	TOTAL
Social Studies	10	7	101	118
Science	29	3	105	137
Mathematics	0	0	722	722
TOTAL	39	10	928	977

Table 19 and the data it presents is a summary of the 16 items listed in Instrument One for the three subjects of social studies, science, and mathematics.

The sixteen items that were listed in Instrument One represent several aspects of student behavior that are observable. With the exception of item fourteen relating to pupils presenting material to another class, behavior was observed for the other fifteen items. This was particularly true of the science and social studies classes. Fifteen items were recorded for the social studies classes and thirteen for the science classes. Seven of the items were recorded for the mathematics classes. Either these behaviors were not observed or were impossible to record due to the nature of the individualized mathematics program. For example, it was not always possible to hear the conversation between the teacher and the individual student; therefore, such items as suggesting solutions to problems, telling about a trip, or discussions with parents were not observed during the mathematics classes. These items were more easily observed in classes that were taught in group situations.

TABLE 19

SUMMARY OF DATA OBTAINED FROM INSTRUMENT ONE FOR THE SUBJECTS OF SOCIAL STUDIES, SCIENCE AND MATHEMATICS

ITEMS	TEACHER-INITIATED			PEER-INITIATED			SELF-INITIATED			TOTAL		
	SS	SC	M	SS	SC	M	SS	SC	M	SS	SC	M
1	0	3	0	0	0	0	8	5	0	8	8	0
2	0	6	0	0	0	0	38	11	0	38	17	0
3	7	4	0	1	1	0	2	4	0	10	9	0
4	713	709	443	66	58	2	34	26	1	813	793	446
5	21	21	0	2	0	0	20	0	0	43	21	0
6	207	290	0	2	0	0	39	2	0	248	292	0
7	2	0	0	0	0	0	17	14	1	19	14	1
8	0	1	0	1	0	0	10	2	0	11	3	0
9	3	1	0	0	0	0	19	10	0	22	11	0
10	0	1	0	0	1	0	1	8	0	1	10	0
11	162	126	1	0	0	0	5	27	23	167	153	24
12	183	4	0	0	0	0	16	12	88	199	16	88
13	0	0	0	0	0	0	2	0	4	2	0	4
14	0	0	0	0	0	0	0	0	0	0	0	0
15	22	2	4	3	0	0	25	3	1406	50	5	1410
16	10	29	0	7	3	0	101	105	722	118	137	722
TOTAL	1330	1197	448	82	63	2	337	229	2245	1749	1489	2695

Combining all sixteen items from Instrument One, for all observations indicated which classes were more teacher-initiated, peer-initiated, or self-initiated. Appearing in Table 20 are the total observation scores for the three classes; it also shows the precentage of initiated behavior for each category. The items observed with Instrument One for individualized mathematics classes were classified 83.3% self-initiated, while the science classes, 15% self-initiated and the social studies classes 19%. The items for the science classes were 80% teacher-initiated, social studies classes 76%, while the mathematics classes were 16%. Records obtained for the two mathematics classes show the lowest score for peer-initiated activities. Peer-initiation in the social studies classes was 4.6%, in the science classes 4.2%, whereas those in the mathematics classes were .07%.

It should be noted that item 15 listed in Instrument One categorized 1406 behaviors as self-initiated for the individualized subject of mathematics. Therefore, of the total 2245 behaviors categorized as self-initiated in mathematics, 1406 are from one item. It could be argued that this behavior is part of the procedures for the individualized classes and should be considered as teacher-initiated. If this were done, the percentage for teacher-initiated and self-initiated behavior listed in Table 20 would change. The mathematic classes would be approximately 68% teacher-initiated and 31% self-initiated. This serves to indicate that the individualized classes would still be more self-initiated than the non-individualized classes.

TABLE 20

DATA OBTAINED FROM INSTRUMENT ONE--TOTAL OF ALL ITEMS AND PERCENTAGES

CLASS	TEACHER-INITIATED NO.	TEACHER-INITIATED %	PEER-INITIATED NO.	PEER-INITIATED %	SELF-INITIATED NO.	SELF-INITIATED %	TOTAL NO.	TOTAL %
Social Studies	1,300	76.04	82	4.69	337	19.27	1,749	100
Science	1,197	80.39	63	4.23	229	15.38	1,489	100
Mathematics	448	16.63	2	.07	2,245	83.30	2,695	100

The first hypothesis postulated that there would be an increase in self-initiated activities in the individualized mathematics classes following the introduction of the treatments. Appearing in Table 21 are the data from Instrument One for the self-initiated scores for the mathematics classes. The data are organized by observations for each week. Notice that seven items were observed for the mathematics classes and that four items account for most of the activity.

The first treatment which was the development of a mathematics materials center was introduced after the first week of observation and continued in effect during the course of the study. Item eleven which was "Pupils read a book in class," increased nine incidents between the first and second weeks of observations. This behavior continued during the third and fourth weeks of observations with seven incidents being credited for each of the two weeks. Supplementary reading material related to mathematics was part of the mathematics materials center. Item twelve, which was "Pupils work with supplemental materials," increased thirty-five incidents after the introduction of Treatment One. This behavior continued during the third and fourth weeks of observation, but at a reduced rate. That is, the behavior was observed thirty-one times during the third week of observation and twenty-two times during the fourth week of observation. Item sixteen was not recorded during the first week of observation and, therefore, cannot be included as evidence of increased self-initiation.

TABLE 21

SELF-INITIATED SCORES DERIVED FROM THE USE OF INSTRUMENT ONE IN MATHEMATICS CLASSES

ITEM	OBSERVATION WEEK 1	OBSERVATION WEEK 2	OBSERVATION WEEK 3	OBSERVATION WEEK 4	TOTAL
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	1	0	0	1
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	1	1
8	0	0	0	0	0
9	0	0	0	0	0
10	0	0	0	0	0
11	0	9	7	7	23
12	0	35	31	22	88
13	0	0	4	0	4
14	0	0	0	0	0
15	396	437	326	247	1,406
16	---	285	265	172	722
TOTAL	396	767	633	449	2,245
TOTAL LESS ITEM 16	396	482	368	277	1,523

The Second Treatment permitted students to select an optional area of mathematics. Half of the time scheduled for mathematics was devoted to optional work. *Treatment Two* occurred between the second and third weeks' observations and continued in effect during the entire study.

As indicated in Table 21, the number of units of work completed by the students for the optional areas was sixty-nine, while one hundred and twenty-eight units of work were completed for the prescribed areas.

Treatment Three, which was applied between the third and fourth series of observations, had teachers make a concentrated effort to praise exceptional work during mathematics classes and display student material. No evidence of the success of this treatment was observable through the use of *Instrument One*.

The increase in the use of concrete materials and the use of supplementary books suggests that *Treatment One* effected the self-initiated activities during the mathematics classes. It further suggests that, if the use of supplemental materials is an important behavior, specific provisions must be made within the classroom to encourage this behavior.

As Table 22 shows, more units of work were completed when teachers prescribed the mathematics units. Although sixty-nine optional units were completed during the study, one hundred and twenty-eight units were completed by teacher assignment. The skills within a unit of work are not equal in number or difficulty. Therefore, it is not known if the 69 optional units represents less work on the part of the students than the 128 units of prescribed work. Also, it is not known if a total of 197 units of work would have been completed by the students if optional work had not been introduced. It was the writer's observations that the students worked harder and asked more questions during optional days. Also, students tended to select more difficult units of work during optional days. Geometry and the study of other number bases were very popular. With the exception of students requesting work in special areas, Instrument One did not reveal any other effect of Treatment Two.

TABLE 22

NUMBER OF OPTIONAL AND PRESCRIBED UNITS OF WORK COMPLETED FOR MATHEMATICS

CLASS	OPTIONAL UNITS	PRESCRIBED UNITS	TOTAL
Fifth Grade	43	87	130
Sixth Grade	26	41	67
TOTAL	69	128	197

The increase of self-initiated behavior for items eleven and twelve and the additional requests for study in a special area suggests that there was an increase in specific self-initiated activities which the treatments were designed to enhance in the individualized mathematics classes. Therefore, hypothesis one is not rejected.

The second hypothesis stated, "There will be no noticeable increase in self-initiation in the untreated subject of social studies." The data presented in Table 23 are the self-initiated scores derived from Instrument One for the social studies classes.

During the first week of observations a total of 57 self-initiated behaviors were observed. The second week of observations produced a total of 156 self-initiated behaviors. This included 47 behaviors for item 16 which was not included during the first week of observations. The total self-initiated score for the third week of observation was 80, including

35 incidents for item 16. The last observation produced a total of 46 self-initiated activities, including 19 for item 16. Based on the score of 57 for the first week of observations and a total score of 27 (not including item 16) for the last week of observations, it is apparent that there was no increase in self-initiation in the social studies classes.

TABLE 23

SELF-INITIATED SCORES DERIVED FROM THE USE OF INSTRUMENT ONE IN SOCIAL STUDIES CLASSES

ITEM	OBSERVATIONS WEEK 1	OBSERVATIONS WEEK 2	OBSERVATIONS WEEK 3	OBSERVATIONS WEEK 4	TOTAL
1	0	3	2	3	8
2	27	6	4	1	38
3	2	0	0	0	2
4	3	6	17	8	34
5	2	18	0	0	20
6	11	27	1	0	39
7	0	2	5	10	17
8	1	4	3	2	10
9	8	5	4	2	19
10	0	0	1	0	1
11	0	15	4	0	5
12	0	13	2	1	16
13	1	1	0	0	2
14	2	0	0	0	0
15	0	23	2	0	25
16	--	47	35	19	101
TOTAL	57	156	80	46	337
TOTAL LESS ITEM 16	57	109	45	27	236

Therefore, hypothesis 2 is not rejected. It should be noted that items 2 and 6 seem to substantially decrease from the first week of observations to the fourth week. Item 2, pupils make an oral report, seems to depend largely on the nature of the subject material and the technique used to to teach. This may account for this change. Item 6, pupils vlunteer to do homework or research assignment, decreased from 11 obserations the first week to no observations the fourth week. Since thisdata relates only to self-initiated activities of pupils, it doesn't seem to be unreasonable to expect such a change from one week of classoom observations to another.

Item 7, pupils suggest methods or solutions to problem, increased from 0 to 10 incidents from the first to fourth weeks of obserations. There seems to be no relationship between this item and the tratment employed.

The data present in Table 24 are the self-initiated scores derived from Instrument One for the science classes.

Hypothesis three stated, "There will be no noticeable increase in self-initiation in the untreated subject of science. The total self-initiated score for the first week of observations was seven. This total increased to 37 during the second week, 39 during the third week, and 19 for the fourth week. Item 16 is not included in the totals since it was not included for the first week of observations. These data suggest that self-initiation did increase during the study. Therefore, hypothesis three is rejected. Note that item 11, pupils read a book in class, increased from the first to the last observation and was substantially higher during the third week. This occurred when the teacher introduced a library of science material to the class for independent work.

Hypothesis four states, "There is a significant relationship between I.Q. score and self-initiation before and after treatments are applied." Appearing in Table 25 is the correlation of the self-initiation score for mathematics, before and after the treatments. It can be seen that there is no substantial correlation between I.Q. score and self-initiation. Therefore, this hypothesis is rejected.

TABLE 24

SELF-INITIATED SCORES DERIVED FROM THE USE OF
INSTRUMENT ONE IN SCIENCE CLASSES

ITEM	OBSERVATIONS WEEK 1	OBSERVATIONS WEEK 2	OBSERVATIONS WEEK 3	OBSERVATIONS WEEK 4	TOTAL
1	0	0	3	2	5
2	3	1	4	3	11
3	2	1	0	1	4
4	0	13	9	4	26
5	0	0	0	0	0
6	1	1	0	0	2
7	1	3	6	4	14
8	0	1	0	1	2
9	0	2	5	3	10
10	0	7	0	1	8
11	0	3	24	0	27
12	0	5	5	2	12
13	0	0	0	0	0
14	0	0	0	0	0
15	0	0	3	0	3
16	--	45	37	23	105
TOTAL	7	82	96	44	229
TOTAL LESS ITEM 16	7	37	59	21	124

Hypothesis five indicated that, "There is a significant relationship between scores on standardized achievement tests in mathematics and self-initiation." In Table 26 are the data derived from correlation of standardized achievement test scores for mathematics concepts and problem solving with the final self-initiation score. The correlation score suggests substantially no correlation. Therefore, this hypothesis is rejected.

TABLE 25

CORRELATIONS OF I.Q. WITH SELF-INITIATION SCORES FOR MATHEMATICS BEFORE AND AFTER TREATMENTS*

OBSERVATION	N	CORRELATION OF I.Q. WITH S-I SCORE IN MATHEMATICS
Before Treatment	49	.15
After Treatment	49	.21

*Neither of the correlation coefficients present in Table 25 differ significantly from zero.

TABLE 26

CORRELATIONS OF SELF-INITIATION SCORE WITH STANDARDIZED MATHEMATICS SCORE FOR PROBLEM SOLVING AND CONCEPTS*

AREA	N	CORRELATION
Problem Solving	49	.165
Concepts	49	-.002

*Neither of the correlation coefficients presented in Table 26 differ significantly from zero.

Hypothesis six stated, "There is no significant relationship between sex of students and self-initiation." Using the final self-initiation score and correlating it with the sex of students gives a correlation of .124. Therefore, this hypothesis is not rejected.

B. Student Expressed Interest

Attempts were made to determine the degree of interest each student had in the school subjects of mathematics, science and social studies. A thirty-item questionnaire (See Appendix 2.) listing fifteen positive and fifteen negative statements was developed for this study. This questionnaire, Instrument Two, was administered during the first and last weeks of the study. Students were asked to complete the positive statements one day and the negative statements the next in order to measure the consistency of the instrument. During the second administration, the last week of the study, this process was repeated. Of primary concern to the study was the determination of change in expressed interest after the treatments were applied. The instrument permitted the determination of interest in the three subjects of mathematics, science, and social studies. The scores for mathematics relate to the hypothesis to be tested, however, the science and social studies scores are also reported.

To determine an interest score for the pupils, credit was given each time they indicated a preference to complete a specific activity for the school subject. Credit was also given for each indication of preference the student did not prefer (using the fifteen negative statements) and subtracted from the original score to determine the total score. For example, if the mathematics score for the fifteen positive statements was ten and the negative statements three, the student's total score was seven. The possible range of scores, then, was -15 to +15. To eliminate the use of negative numbers, 15 was added to each score. Therefore, the actual range of scores for Instrument Two was 0 to +30.

An attempt was made to include items in Instrument Two that related to student activities in an elementary school. For examples, reading for pleasure, answering questions, doing extra work, writing stories, etc. are typical of the areas surveyed in Instrument Two. This method of constructing the instrument, based on activities of elementary school age children, would result in the instrument having a high degree of content validity. To determine reliability of Instrument Two, the split-half correlation technique was used and the Spearman-Brown correction applied. Although the students expressed interest in mathematics was of primary concern to this study, an index of interest was also derived for the subjects of social studies and science. The data appearing in Table 27 are for this series of correlations. A moderate degree of reliability was obtained.

TABLE 27

CORRELATIONS OF EXPRESSED INTEREST USING
THE SPLIT-HALF TECHNIQUE

SUBJECT	BEFORE TREATMENT	AFTER TREATMENT
Mathematics	.581	.731
Science	.679	.667
Social Studies	.682	.769

Hypothesis seven stated, "There will be a significant increase in student interest in the individualized mathematics classes after the treatments." Appearing in Table 28 are the data listing the mean scores of expressed interest in the subjects of mathematics, science, and social studies. Since the mean scores decreased for the mathematics classes, this hypothesis is rejected.

TABLE 28

MEAN SCORE OF EXPRESSED INTEREST IN MATHEMATICS, SCIENCE, AND SOCIAL STUDIES BEFORE AND AFTER TREATMENTS

	MATHEMATICS	SCIENCE	SOCIAL STUDIES
Before Treatments	14.02	19.73	17.38
After Treatments	13.40	16.97	18.10

C. Student and Teacher Rating of Extra School Work of Pupils

During the first week of the present research, the students were asked to rate their classmates as to the degree of extra school work each did. Teachers were also asked to rate the students, using the same instrument. A five-point rating scale ranging from never to very often was used. This instrument is described in Chapter IV, page 21. A second rating was completed by teachers and students during the last week of the study. Of particular interest was the relationship between teacher and student ratings of extra school work and the relationship of students' ratings of each other before and after treatments.

Hypothesis eight stated, "There will be no significant change in the peer-evaluation of self-initiation." The mean peer-evaluation ratings for the first administration was 2.77 while that for the second administration was 2.82. Using the t-test to determine the significance of difference between these means gives a value of .108. This indicates no significant change of the mean scores at the 1 per cent level, therefore, this hypothesis is not rejected. Appearing in Appendix D are the total scores for all students.

In Table 29 are presented the correlations of teacher-student ratings before and after treatments. The correlation between the first rating of students and teachers was .563, while the second rating correlated .699. It can be noted that the teacher and student correlation scores have a higher degree of relationship after the treatments.

TABLE 29

CORRELATIONS BETWEEN TEACHER RATING OF SELF-INITIATION AND PUPIL RATING OF SELF-INITIATION BEFORE AND AFTER TREATMENTS*

	N	TEACHER-STUDENT
Before Treatment	49	.563
After Treatment	49	.699

*Significant at the .01 level

Hypothesis 9 stated, "There is a significant relationship between teacher rating and peer-evaluation of self-initiation." The correlations scores presented in Table 29 suggests a moderate relationship, therefore this hypothesis is not rejected.

D. Student Interviews

At the conclusion of the study, the writer solicited information from the students during interviews concerning methods of teaching the three subjects of mathematics, science, and social studies, effect of the treatment in mathematics employed, ambitions for adulthood, and basic interest in school subjects.

Students were asked during the interview to name their favorite school subject. Appearing in Table 30 are the data obtained from the students in response to the area of favorite school subjects. Mathematics and physical education classes were selected most often by the fifth grade students, while social studies was selected by the sixth grade students.

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TABLE 30

STUDENT SELECTION OF FAVORITE SUBJECTS DURING INTERVIEWS

SUBJECT	NUMBER OF FIFTH GRADE STUDENTS	NUMBER OF SIXTH GRADE STUDENTS
Mathematics	6	4
Social Studies	4	6
Science	4	5
Physical Education	6	1
Spelling	2	3
Art	1	1
English	0	1
Reading	0	1
All of the School Subjects	2	0
None of the School Subjects	1	0
TOTAL	26	22

Children were asked to respond to the question, "What do you like about the way mathematics is taught?" The responses were varied with, "I like being on my own," "It's different," "You can teach yourself," and "No homework," being most prevalent. One student indicated a preference for the "old way." Appearing in Table 31 are the data obtained for this question.

When students were asked, "What do you like about the way social studies is taught," the answers were almost as varied as the number of student responding. However, doing project work and studying about particular people or events were the responses most often given. Two students, one in each grade, indicated that they did not like the subject. Appearing in Table 32 are the answers students volunteered for this question.

TABLE 31

STUDENT RESPONSES DURING THE INTERVIEW TO THE QUESTION, "WHAT DO YOU LIKE ABOUT THE WAY MATHEMATICS IS TAUGHT?"

RESPONSE	FIFTH GRADE	SIXTH GRADE
I am on my own.	4	3
It is different.	4	0
I can teach myself.	1	4
There is no homework.	1	3
I can check my own work.	2	0
It's easier.	2	3
Everybody is at a different place.	1	0
There are no books.	2	1
Nobody rushes me.	2	0
I can go at my own speed.	2	4
I like optional days.	1	0
I like the learning center.	1	0
I like the folders.	1	1
I like to get my own papers.	1	0
I like the tests.	0	1
There are no lectures.	0	1
I do not repeat material.	0	1
I like the old way better.	1	0
TOTAL	26	22

TABLE 32

STUDENT RESPONSES DURING THE INTERVIEW TO THE QUESTION, "WHAT DO YOU LIKE ABOUT THE WAY SOCIAL STUDIES IS TAUGHT?"

RESPONSE	FIFTH GRADE	SIXTH GRADE
I like project work.	4	8
I like the subject matter.	9	3
I like map work.	2	0
I like the two books.	2	0
I like stories.	1	0
I like famous people.	2	2
I like reports.	0	2
I like to read out loud.	0	1
I like new information.	0	1
I like class discussion.	1	0
I receive A's.	1	0
I don't like it.	1	0
I like vocabulary work.	1	0
I like wars.	0	1
I like extra credit.	1	0
I like outlining.	0	1
I like movies.	0	1
I like study questions.	0	1
I like to read ahead.	1	0
TOTAL	26	22

During the school year, 1964-1965, the science program at Oakleaf School was individually prescribed for the fifth and sixth grades. This was not true during the 1965-1966 school year. Therefore, during the interviews, students were asked which way they best liked science taught. Table 33 and the data it presents shows that the fifth grade class was divided as to its feeling about the way to teach science. The sixth grade class preferred the individualized approach. When students were asked why they did not prefer the individualized approach, they indicated equipment failures caused too much confusion.

TABLE 33

STUDENT RESPONSES DURING THE INTERVIEW TO THE QUESTION, "WHICH WAY DID YOU PREFER TO HAVE SCIENCE TAUGHT, LAST YEAR'S INDIVIDUALIZED METHOD OR THIS YEAR'S METHOD?"

RESPONSE	FIFTH GRADE	SIXTH GRADE
Last year	13	16
This year	13	5
Not at Oakleaf two years	--	1
TOTAL	26	22

During the course of the study, one treatment introduced was the development of a mathematics materials center. The students were asked during the interview if they used the materials center, and if so, what materials they found helpful. All of the fifth grade students said they used the mathematics materials center, while seventeen sixth grade students indicated the same. Five sixth grade students revealed they did not use the mathematics materials center. Appearing in Table 34 is the list of materials the students indicated were of some help. It should be noted that extra practice sheets and flash cards were more often used by the students.

TABLE 34

MATERIALS USED BY STUDENTS FROM MATHEMATIC MATERIALS CENTER

MATERIALS	FIFTH GRADE	SIXTH GRADE
Practice sheets	6	0
Flash cards	4	12
Dry measures kit	4	0
Books	3	1
Records	1	0
Rods	1	0
Number games	1	0
Pegboards	1	0
Geometric shapes	1	1
Film strips	0	2
Puzzles	0	1
No answer	4	5
TOTAL	26	22

The students were asked if they brought from home any materials to contribute to the mathematics materials center. One student indicated that he had, forty-seven said they did not.

The selection of optional areas in mathematics was the second treatment introduced during the study. The students were asked during the interview what optional areas they had selected and why. The data presented in Table 35 lists the optional areas selected by the students.

TABLE 35

OPTIONAL UNITS SELECTED AS INDICATED DURING THE INTERVIEW

OPTIONAL MATHEMATICS UNIT	FIFTH GRADE	SIXTH GRADE
Numeration	2	2
Place Value	0	2
Addition	5	3
Subtraction	3	3
Multiplication	5	3
Division	4	6
Combination of Processes	1	0
Fractions	3	2
Money	3	0
Time	1	0
Special Topics	1	0
Geometry	14	4
TOTAL	42	25

A total of 67 incidents appear. Table 21 indicated that the students actually completed 69 units. Considering the youngsters were responding from memory, to forget only two units is very interesting. It is clear that the students were more interested in geometry as an optional area. The reason most often given for the selection of an optional unit of work was that the student liked to do those kinds of problems. Notice that the fifth grade class completed 42 units of work, while the sixth grade, 22. The fifth grade class averaged one and half units of work per student, while the sixth grade, one unit per student.

Students were also asked if they changed optional units during the course of the study. Seventeen fifth grade students indicated that they had, while eight said they did not. Only two sixth grade students indicated they they changed optional units while seventeen said they did not. A total of four students, one fifth grader and three sixth graders, did not choose to do optional work.

During the interviews the students were asked which days they preferred to do mathematics, that is, the optional days or the prescribed. Appearing in Table 36 is the student's selection of preferred days. Both classes were divided as to their choices.

TABLE 36

STUDENT RESPONSES DURING THE INTERVIEW TO THE SELECTION OF PREFERRED MATHEMATIC DAYS--OPTIONAL OR PRESCRIBED

RESPONSE	FIFTH GRADE	SIXTH GRADE
Optional days	9	10
Prescribed days	10	8
Don't know	1	1
Like them both	6	3
TOTAL	26	22

When students were asked if they would like to have mathematics taught the same way next school year, including optional days, 25 fifth graders and 20 sixth graders indicated that they would. Three students said they would not, one fifth grade student and two sixth graders.

The third treatment was the encouragement by teachers of exceptional mathematics achievement and providing during one of the mathematics classes an opportunity for students to present to the class mathematical matters of interest. During the interviews the students were asked, "Did you have an opportunity to present to your classmates some of the work you were doing in mathematics?" Twelve of the fifth grade students answered yes to the question, while only four sixth graders so indicated. Fourteen fifth grade students said that they did not have an opportunity to present their work to the class, eighteen sixth graders responded similarly. Appearing in Table 37 are the data obtained for this question.

TABLE 37

STUDENT RESPONSES DURING THE INTERVIEW TO THE QUESTION, "DID YOU HAVE AN OPPORTUNITY TO PRESENT TO YOUR CLASSMATES SOME OF THE WORK YOU WERE DOING IN MATHEMATICS?"

RESPONSE	FIFTH GRADE	SIXTH GRADE
Yes	12	4
No	14	18
TOTAL	26	22

Table 38 contains the responses students made when asked, "What would you like to be when you grow up?" The categories of teacher and secretary were most often given. However, the largest category for both classes was, "I don't know." This question was included as part of the interview to help determine interest. The choice of "teacher" seems to indicate an interest in school.

Students were asked if they thought the teacher was always right. The answers were divided in both classes with twelve students in fifth grade indicating sometimes, and eight sixth grade students indicating the same. The majority of sixth grade students said "no" in reply to this question. This was not true of the fifth grade class. Appearing in Table 39 are the data given in response to this question.

When students were asked what they do when they think the teacher is wrong, the vast majority indicated that they attempted to prove to the teacher she is wrong. Only several students implied that they "just accept it."

When students were asked if they believed that the materials they use in school, such as textbooks and worksheets were always right, they all said "no." When asked what they do when they find a passage or problem they feel is incorrect, they all said that they asked the teacher.

TABLE 38

STUDENT RESPONSES DURING THE INTERVIEW TO THE QUESTION, "WHAT WOULD YOU LIKE TO BE WHEN YOU GROW UP?"

RESPONSE	FIFTH GRADE	SIXTH GRADE
Teacher	4	3
Secretary	1	4
Don't Know	6	5
Lawyer	2	0
Scientist	2	1
Nurse	2	0
Chemist	0	2
Doctor	2	1
Mechanic	2	0
Housewife	1	0
Football Player	1	0
Baseball Player	1	1
Electrician	0	1
Geologist	0	1
Pilot	0	1
Artist	0	1
Architect	0	1
Engineer	1	0
Motorcycle Driver	1	0
TOTAL	26	22

TABLE 39

STUDENT RESPONSES DURING THE INTERVIEW TO THE QUESTION, "DO YOU THINK THE TEACHER IS ALWAYS RIGHT?"

RESPONSE	FIFTH GRADE	SIXTH GRADE
Yes	8	6
No	6	8
Sometimes	12	8
TOTAL	26	22

VI. FINDINGS AND CONCLUSIONS, COMMENTS AND RECOMMENDATIONS FOR FURTHER RESEARCH

A. Findings and Conclusions

This study was undertaken to investigate factors associated with a program for encouraging self-initiation in a highly individualized environment. Classroom observations, treatments to encourage self-initiation, expression of student interest, student and teacher ratings of extra school work, and student interviews were all components. Nine hypotheses, set down in Chapter II, Section B, were analyzed. Hypotheses one, two, and three were concerned with the increase in self-initiated activities in individualized and non-individualized classes and the relationship to treatments applied. Hypotheses four, five, six, and seven were concerned with the relationship between self-initiation and expressed interest of students, intelligence, school achievement, and sex of students. Hypotheses eight and nine were concerned with peer and teacher evaluations of the amount of extra work students do in school.

Eight classroom observations were conducted for the individualized classes in mathematics and the non-individualized classes of science and social studies. The observations were conducted over a four-month period with three specific treatments introduced in the individualized mathematics classes as an attempt to improve self-initiation. The observation instrument, Instrument One, listed 16 specific behaviors or activities. These behaviors or activities were categorized as they occurred and classified as being teacher-initiated, peer-initiated, or self-initiated.

During the classroom observations, only one behavior or activity was not observed, that being "pupils presenting material to another class." Fifteen of the sixteen items were observed during social studies classes, thirteen during science and seven during mathematics classes.

Combining all 16 items from Instrument One, for all observations, indicated which classes were more teacher-initiated, peer-initiated, or self-initiated. The individualized mathematics classes were 83.8% self-initiated, while the science classes 15.38% self-initiated, and the social studies classes 19.27%. The science classes were 80.39% teacher-initiated, social studies classes 76.04%, while the mathematics classes were 16.63%. Peer-initiation in the social studies was 4.69%, in the science classes 4.23%, while the mathematics classes were .07%. This finding seems to imply that, if self-initiation is a goal to be achieved, specific procedures must be used within the framework of class time to encourage such behavior, and that the procedures employed in the individualized mathematics lend themselves to the encouragement of self-initiation. Teacher-initiation is greatly reduced in the individualized classes, therefore, dictates a different role for teachers. Notice that peer-initiated activities within the individualized classes were almost non-existent. This suggests further analysis of the importance of peer-initiated activities within the school and the development of techniques and strategies to enhance such behavior. Self-initiated activities in the non-individualized classes of science and social studies ranged from 16 to 19%. If this type of behavior is to be improved in these classes, specific provisions must be made and techniques employed. Teacher-initiation of behavior and activities within the non-individualized classes were much greater than in the individualized setting. As previously noted, the role of the teacher played in both settings was different. That is, the teacher in the non-individualized classes was the "hub" of most activity. Whereas, the students seem to be the focal point in the individualized approach.

Specific self-initiated behavior, such as students asking questions, working with supplemental material, and seeking assistance with the scoring of material, or going to the library, were much greater in the individualized classes. As previously noted, seven times as many questions were asked during the individualized programs, and working with supplemental materials from a self-initiated point of view occurred as often as eight times more often in the individualized classes. Pupils going to the library, to clerks to have assignments checked, or the self-scoring materials occurred at an astronomical rate when comparing indivisualized with non-individualized classes. This suggests that the procedures within the individualized classes permit and encourage such behavior, whereas this was not true in the non-individualized sections.

Hypothesis one stated, "There will be a noticeable increase in self-initiated activities in the individualized mathematics classes after the treatments." Although the total self-initiated activities of the individualized mathematics classes decreased from 396 incidents the first week of observations to 227 incidents the fourth week, specific item increases that relate to the treatments did occur. Pupils reading books in class, working with supplemental materials and requesting study in special areas are examples of increased self-initiated behavior. Therefore, hypothesis one is not rejected.

Hypotheses two and three indicated that there would be no noticeable increase in self-initiation in the untreated subjects of social studies and science. The total self-initiated scores for the social studies classes during the first week of observations was 55. This decreased to a score of 27 for the last week of observations. The self-initiation score for the science classes during the first week of observations was seven. This increased to a score of 23 for the last week of observations. This data suggests that a decrease occurred in self-initiation in the social studies classes, and an increase appeared in the science classes. Therefore, hypothesis two is not rejected, while hypothesis three is rejected.

Hypotheses four and five suggested that there is a relationship between self-initiation and I.Q. and achievement test results. No significant correlation was found between these variables and the self-initiation score in mathematics. Therefore, hypotheses four and five are rejected. Hypothesis six postulated that there would be no relationship between the sex of a student and self-initiation. Using the final self-initiation score for mathematics and correlating it with the sex of students results in a correlation of .124. Therefore, this hypothesis is not rejected.

Hypothesis seven indicated that there would be an increase in student interest in mathematics after the self-initiation treatments. Based on the data presented in Chapter V, Section B, this hypothesis is rejected. The mean score of expressed interest in mathematics, in fact, decreased after treatments. However, the decrease was .62, which is considered negligible.

Hypothesis eight stated, "There will be no significant change in the peer-evaluation of self-initiation." Using the t-test to determine the significance of difference between the means, indicated no significant change of the mean scores at the 1% level. Therefore, this hypothesis is not rejected.

Hypothesis nine stated, "There is a significant relationship between teacher rating and peer-evaluation of self-initiation." The correlation score between the teacher rating and the peer-evaluation was .563 before treatment and .699 after treatment. Therefore, this hypothesis is not rejected.

The three treatments introduced into the study as attempts to increase self-initiation had limited success. The first treatment, development of a mathematics material center, seemed to create more self-initiation in the mathematics classes. Students did use many of the materials as was evidenced during the classroom observations and the increase in several of the items listed on Instrument One. The second treatment, permitting students to select optional units in mathematics seened to encourage self-initiation, although documented data for this treatment was more difficult to obtain. However, the selection of more difficult work in mathematics and the increased number of questions students ask during optional days suggest the treatments did provide for more self-initiation. The third treatment, providing reinforcement to students during mathematics classes, appears to have been less successful. During the student interviews, it was revealed that this treatment reached about 50% of the fifth grade class and 20% of the sixth grade class (Table 37). It must be noted that the procedures used in the mathematics classes increase student-teacher contact and provide for daily reinforcement. Therefore, it can be concluded that the first treatment was most effective and the last treatment the least. Furthermore, it can be concluded that the treatment had little effect in non-treated classes.

The interviews conducted revealed that students believed that the procedures used in teaching mathematics provided an opportunity for students to work on their own, to teach themselves, and to go at their own speed. These aspects of the procedures used to teach the individualized mathematics were seen as favorable by the pupils. The social studies classes were best liked because of the opportunity to do project work and the nature of the subject itself. When students were asked to choose between an individualized science program, which they had previously, and a non-individualized class, the older students selected the individualized approach. The fifth grade students were divided as to their selection.

The students stated that the mathematics center was helpful and expressed a wish to have it continued. Optional work in mathematics was felt to be worthwhile, and students expressed a desire to continue the optional program.

Although many of the students did not know what they wanted to be when they "grew up," the position of school teacher was appealing. Those who did express their ambitions selected a professional occupation.

Students, when confronted with either incorrect learning material or a situation in which they believed the teacher to be wrong, did not hesitate to suggest how they would handle the problem. The sixth grade students believed that the teacher was incorrect more often than did fifth graders.

From the analysis of the nine hypotheses and the student interviews, we may conclude that:

1. Individualized instruction seems to be more self-initiated than non-individualized.

2. The amount of self-initiation in a classroom can be increased by the introduction of specific techniques to improve this activity.
3. Self-initiation has little relationship to intelligence, achievement, or sex of students.
4. Expressed interest in the subject of mathematics did not change over the four months of the study.
5. The treatments had no measurable effect on expressed interest.
6. The procedures used to encourage self-initiation in the individualized classes had little carry over to the non-individualized classes.
7. The teacher ratings of the amount of extra activity students do for school had a correlation range between moderate to high with the student ratings of each other.
8. The student ratings of extra school activity of each other did not change over the four-month period.
9. The pupils expressed a desire to continue with some of the treatments in their mathematics classes.
10. The students hoped to obtain a professional occupation with "teacher" ranking high.

B. Factors Affecting Limitations of the Study

Several comments seem to be in order to clarify questions which the study may raise and which are not accounted for in any of the previous materials. Clarification of several points is here attempted.

The sixteen items that were listed in Instrument One were drawn from previously developed observation instruments. As these activities were observed, an attempt was made to categorize the source of initiation. Many of the items related to the teaching technique that the teacher used. For example, if project work was the teaching technique used, activities relating to this behavior were most prevalent during the observation.

It should be noted that the procedures used in the mathematics classes occurred four days a week. One day each week students were involved in group activities. No observations were made during this time. That is, observations for the mathematics classes were conducted only during individualized sessions.

The source of initiation was probably the most difficult to accurately categorize. If a student volunteered to tell the class about a place he had visited, this was categorized as self-initiated. However, if the teacher encouraged such reports, by providing class time, or approved such activities through facial expressions, etc., other students might volunteer similar types of reports. It then became increasingly more difficult to properly categorize the source of initiation. No attempt was made to categorize initiation that was stimulated from home experiences. That is, students may have been credited with self-initiated activities that were stimulated by parents or family interests.

The procedures employed in the Individually Prescribed Instruction classes increased the difficulty of using Instrument One. The conversation between a student and the teacher was almost impossible to hear. Therefore, several of the behaviors listed in Instrument One, such as "pupils suggesting solutions to problems," could not accurately be evaluated.

The third treatment, having teacher praise and reinforce student behavior, is used constantly by some teachers. Therefore, when this treatment was introduced into the study, some of the teachers continued to operate as they had previously. The results of this treatment were almost impossible to evaluate.

C. Recommendations for Further Research

This study suggests that self-initiation occurred more often and at a higher rate in the individualized classes than in the non-individualized. It further suggests that the non-individualized classes were more teacher-initiated. Furthermore, self initiation can be improved by providing specific techniques to be used during the class period. It appears that self-initiation has little relationship to usual school measures of classroom performance.

From the data in Table 20, the percent of self-initiation in the individualized classes was much greater than in the non-individualized. This finding opens many possibilities for further research. Larger samples of individualized and non-individualized classrooms should be studied to determine the validity of this finding.

Seven times as many questions were asked by pupils in the individualized classes. This finding suggests further analysis of the kinds of questions pupils ask in the classroom. One wonders if there is any relation between questions asked and teaching techniques used. Further research should expand this finding.

The majority of behaviors or activities that were categorized during the classroom observations depended on verbal responses by students. Individualized classes created special problems in hearing pupil responses. One possibility for conducting classroom observations to overcome this problem could be through the use of electronic devices such as transistorized microphones and tape recorders. The teacher-pupil conversation then could be monitored and more accurate information obtained.

Since verbal responses by students were necessary to gather information concerning self-initiation, the student who is less verbal may be categorized as less self-initiated. This may not be true; therefore, other methods to determine self-initiation should be explored.

Treatments introduced into the study had limited success. Other treatments should be tried in classroom situations. Furthermore, the treatments should not be limited to the individualized classes. One wonders to what degree self-initiation would be improved if the treatments would have been introduced into both individualized and non-individualized sections. Further study is needed to help determine what treatments are most effective in encouraging self-initiation. Furthermore, analysis is needed as to what effect each treatment has on specific students.

Instrument Two developed for the present research was used to measure the students' expressed interest in the school subjects of mathematics, social studies, and science. The items appearing in the instrument were taken from a survey of typical school activities to help insure content validity. Further research is needed for the instrument to provide other types of validity. Instrument Two should be expanded to provide researchers with the ability to measure expressed interest in school subjects other than those used in the present research.

No attempt was made in the present research to relate interest and self-initiation. This aspect of research is almost non-existent and should be included in further studies.

The results of this study indicate that self-initiation can be improved in classroom situations. Since the teacher is the greatest variable in any school situation, it would seem important to investigate the relationship between amount of self-initiation and various qualities of the classroom teaching.

APPENDICES

APPENDIX A: INSTRUMENT ONE
OBSERVERS' RATING SHEET

TEACHER ______________________________ DATE ______________________

GRADE ________________________________ SUBJECT ___________________

OBSERVER _____________________________

DIRECTIONS: Place the pupil number from the attached seating chart in the proper column for each behavior exhibited.

Self-Initiated: those activities or responses observed that do not eminate from teacher direction.

Peer-Initiated: those activities or responses observed that are initiated from another pupil.

Teacher-Initiated: those activities or responses observed that are initiated from the teacher.

BEHAVIOR OR ACTIVITY	INITIATION ORIGINATING FROM		
	TEACHER	PEER	SELF
1. Pupil displays materials brought into classroom. (Such as newspapers, clippings, games, books, collections, etc.)			
2. Pupil makes an oral report.			
3. Pupil presents a written report.			
4. Pupil volunteers to answer questions.			

BEHAVIOR OR ACTIVITY	INITIATION ORIGINATING FROM		
	TEACHER	PEER	SELF
5. Pupil volunteers to work on a committee.			
6. Pupil volunteers to do homework or research assignment.			
7. Pupil suggests method or solution to problem.			
8. Pupil tells about a discussion with parents, friends, or classmates.			
9. Pupil tell about a trip or visit.			
10. Pupil tells about T. V. Program, movie, etc.			
11. Pupil goes to pencil sharpener, bulletin board, water fountain, etc.			
12. Pupil reads book in class.			

BEHAVIOR OR ACTIVITY	INITIATION ORIGINATING FROM		
	TEACHER	PEER	SELF
13. Pupil works with supplemental material.			
14. Pupils request study in special area.			
15. Pupil presents his material to another class.			
16. Pupils ask questions.			

APPENDIX B: INSTRUMENT TWO
PART 1

Name ______________________________ Grade ______________________

School ____________________________ Date _______________________

Directions: Read each statement carefully and circle the answer that tells the way you feel.

1. When I read for pleasure or information, I read books, newspapers, magazines or stories about: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) None of the subjects listed
   (e) All of the subjects listed

2. When my teachers ask questions, I volunteer answers in: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) None of the subjects listed
   (e) All of the subjects listed

3. I like to collect things for: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) None of the subjects listed
   (e) All of the subjects listed

4. When I do extra work for class, without being told, I do the extra things for: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) None of the subjects listed
   (e) All of the subjects listed

5. I often talk to my parents about: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) None of the subjects listed
   (e) All of the subjects listed

6. I talk to my school friends about: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) None of the subjects listed
   (e) All of the subjects listed

7. If I play school with my friends and family, I like to teach: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) None of the subjects listed
   (e) All of the subjects listed

8. If I play school with my friends or family, I like to study: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) None of the subjects listed
   (e) All of the subjects listed

9. I would like to join a club to learn more about: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) None of the subjects listed
   (e) All of the subjects listed

10. If I could work all day on one subject, I would choose to work on: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social Studies
    (d) None of the subjects listed
    (e) All of the subjects listed

11. If I had ten dollars to buy something to help me with my school work, I would spend it for: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social Studies
    (d) None of the subjects listed
    (e) All of the subjects listed

12. I would like to watch T. V. programs about: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social Studies
    (d) None of the subjects listed
    (e) All of the subjects listed

13. I like to do homework in: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social Studies
    (d) None of the subjects listed
    (e) All of the subjects listed

14. If I were the teacher, I would like to teach about: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social studies
    (d) None of the subjects listed
    (e) All of the subjects listed

15. I enjoy writing stories about: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social Studies
    (d) None of the subjects listed
    (e) All of the subjects listed

INSTRUMENT TWO--PART 2

Name ______________________________ Grade ______________________________

School ______________________________ Date ______________________________

Directions: Read each statement carefully and circle the answer that tells the way you feel.

1. When I read for pleasure or information, I don't care to read books, newspapers, magazines or stories about: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) Any of the subjects listed

2. When my teachers ask me questions, I don't volunteer answers in: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) None of the subjects listed

3. I don't like to collect things for: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) Any of the subjects listed

4. I don't do extra work without being told for: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) Any of the subjects listed

5. I seldom talk to my parents about: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) Any of the subjects listed

6. I don't talk to my school friends about: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) Any of the subjects listed

7. If I play school with my friends and family, I don't like to teach: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) Any of the subjects listed

8. If I play school with friends or family, I don't like to study: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) Any of the subjects listed

9. I would not care to join a club to learn about: (Circle one)

   (a) Mathematics
   (b) Science
   (c) Social Studies
   (d) Any of the subjects listed

10. If I could work all day on one subject, I would not choose to work on: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social Studies
    (d) Any of the subjects listed

11. If I had ten dollars to buy something to help me with my school work, I would not spend it for: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social Studies
    (d) Any of the subjects listed

12. I don't care to watch T. V. Programs about: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social Studies
    (d) Any of the subjects listed

13. I don't care to do homework in: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social Studies
    (d) Any of the subjects listed

14. If I were the teacher, I would not care to teach about: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social Studies
    (d) Any of the subjects listed

15. I don't care to write stories about: (Circle one)

    (a) Mathematics
    (b) Science
    (c) Social Studies
    (d) Any of the subjects listed

APPENDIX C: INSTRUMENT THREE

DIRECTIONS: I would like to know how often you think your classmates do extra things for class. Extra things might be telling the class about places they have visited, or bringing to class newspaper articles or pictures, or it might even be reading a special book about a school subject.

Please put a check mark (✓) across from each name telling me how often you think each classmate does extra things. Do not write your name on this paper.

	STUDENTS DO EXTRA THINGS				
NAME OF STUDENTS	NEVER	ALMOST NEVER	SOMETIMES	OFTEN	VERY OFTEN

APPENDIX D: INSTRUMENT THREE--CLASS AND TEACHER RATINGS, FIRST AND SECOND ADMINISTRATIONS

STUDENT	FIRST ADMINISTRATION CLASS MEAN	SECOND ADMINISTRATION CLASS MEAN
1	3.44	2.96
2	4.29	4.20
3	2.48	3.52
4	3.11	3.20
5	2.14	2.48
6	2.85	2.52
7	3.92	3.68
8	2.37	2.20
9	3.14	3.08
10	1.66	1.44
11	3.14	3.40
12	3.44	2.96
13	2.33	2.48
14	3.00	3.80
15	4.11	3.52
16	3.48	3.40
17	2.85	3.08
18	3.92	3.60
19	1.85	2.24
20	3.25	3.68
21	2.70	3.04
22	3.33	3.44
23	3.11	3.28
24	2.85	2.84
25	2.96	3.04
26	2.70	3.04
27	3.81	3.44
28	1.33	2.13
29	2.66	2.45
30	2.47	2.36
31	2.09	2.09
32	2.85	2.40
33	2.33	2.72
34	2.33	2.22
35	2.04	2.04
36	1.61	1.72
37	2.61	2.95
38	2.33	2.27
39	2.19	1.77
40	2.80	2.76
41	3.23	2.81
42	2.38	2.31
43	3.47	3.54
44	2.38	2.22
45	2.47	3.40
46	2.33	2.50
47	2.66	2.72
48	2.76	2.95
49	2.22	2.36

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VITA

Robert G. Scanlon, born April 15, 1933 in North Braddock, Pennsylvania, received his elementary education at North Braddock Public Schools. High school education was completed at Scott High School, North Braddock, Pennsylvania. In 1954, he was awarded the degree of Bachelor of Science in Education from Duquesne University. He taught elementary school from 1954 to 1959. In 1956, he was awarded the degree of Master of Education, also from Duquesne University. From 1959 to 1962 he served as Elementary Administrator in Leetonia, Ohio. In 1962, he was appointed Director of Elementary Education in Middletown, New York. In 1965, he was appointed Research Assistant at the Learning Research and Development Center of the University of Pittsburgh and served as the principal of Oakleaf Elementary School.